



# Understandings and practices related to risk, immunity and vaccination during the Delta variant COVID-19 outbreak in Australia: An interview study



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## ABSTRACT

**Background:** The aim of this study was to use indepth social research to better understand the relationships and intersections between understandings and practices of COVID-19 risk, immunity and vaccination in lay people's accounts.

**Methods:** This article reports findings from a qualitative research project involving semi-structured telephone interviews with a diverse group of 40 adults from around Australia about their experiences of the COVID crisis, conducted in late 2021 during the Delta variant outbreak. The participants' responses to questions about COVID risk, COVID vaccines and how they thought they could best protect their health were analysed using an inductive thematic approach.

**Results:** A notion of 'communal risk' was expressed together with 'individual risk'. Relatedly, people's understandings of what might be characterised as 'communal immunity' as well as individual immunity also dominated in their accounts. Both communal risk and communal immunity are influenced by a range of constantly changing and interrelated factors. Locale was a strong factor in shaping people's experiences and stances related to COVID risk. The participants referred to aspects such as their community's geographical location; the number of COVID cases and the level of COVID vaccination by others living in their state or territory; adoption of preventive measures; vaccine availability, scheduling and take-up; viral testing and tracing reporting; and the extent and timing of viral spread in the population. These factors were continually related back to highly specific conditions and practices in their community or state of residence.

**Conclusions:** Understandings and practices related to COVID risk, immunity and vaccination were based both on individual experiences and broader ideas about the role of community. Spatial contexts are influential but there is also a strong temporality to these understandings and practices. There is a fine balance to be maintained between individual-level protection from COVID risk and community-level actions.

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## Introduction

Since the outbreak of the COVID-19 pandemic, risk discourses and practices have re-emphasised the threats posed by viruses to human health and longevity [1,2]. During this time of new viral crisis, the topics of vaccination and immunity have also received intensified prominence in public forums. Once COVID vaccines were developed and approved, their relative merits and side-effects were publicly debated [3–5]. Google searches for the term 'immunity' and for COVID vaccines dramatically increased after the onset of the pandemic [6,7]. So-called 'immunity passports' (certificates demonstrating the holder's proof of full vaccination)

have been used as public health measures in many countries as a way of encouraging people to seek vaccination to prevent COVID spread between regions and nations [8]. Topics such as how the human immune system works in response to viruses and how long immunity lasts after natural viral infection or vaccination have also received heightened discussion and scrutiny in the global popular media and on the part of government agencies and public health authorities [6,9]. Establishing herd immunity through exposure to infection as a public health strategy has been proposed and vigorously debated in some countries [10,11]. Public health messaging has emphasised that people with pre-existing health conditions or who are immunocompromised are at higher risk of severe COVID or death [12].

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To better understand the relationships and intersections between concepts and practices of COVID risk, protection from infection, vaccination and immunity to viral infection, indepth social research that is able to probe people about their understandings and practices related to these aspects of their health and bodies can be insightful. Previous social research conducted across different parts of the world has shown that people's ideas about risk and protection in response to the COVID crisis are complex and dynamic: situated in personal experience, time and place. Risk-related understandings and practices are highly interdependent with factors such as numbers of COVID cases in participants' place of residence, the tenor of news reporting in their locale and their observations of how other people they see in their locale behave. Other influences are people's own state of health as well as their age, occupation, religious faith, educational background, political views or trust in experts or government [13–18]. Indepth qualitative research conducted in countries as diverse as Côte d'Ivoire [19], Nigeria [20], England [21], Switzerland [22], Sweden [23] and China [24] have demonstrated the intersections of such sociocultural factors with ideas about COVID vaccination acceptance, hesitancy or rejection.

Building on these studies, this article presents findings from the second phase of the 'Australians' Experiences of COVID-19' project. This qualitative project was designed from a sociological perspective to elicit insights into Australian adults' experiences of living through the COVID crisis, across a wide range of age groups and living across Australia: including people in regional and rural areas. To date, this continuing project has involved two stages, each involving qualitative telephone interviews with 40 adult Australians about their experiences of the COVID crisis. Stage 1 interviews were conducted during the early months of the pandemic, when Australians were still learning about COVID and were emerging from the first lockdown period, which was implemented nationally. The interviews for Stage 2 were conducted more than a year later, during which time further localised lockdowns, new COVID variant outbreaks and major changes in the COVID crisis and government management had occurred. Many topics were raised in the interviews, including how participants' lives had changed due to the pandemic, how they coped with periods of isolation and lockdown, what sources of COVID information they found most useful and their assessments of government responses to the pandemic. Most questions were shared across the two stages. However, a set of new questions relating to COVID vaccines were included in the Stage 2 interview schedule so as to address major issues and challenges that had arisen since the Stage 1 interviews had been conducted.

In the present article, I report on findings from the Stage 2 interviews, undertaken in September and October 2021 when Australia was emerging from a difficult period dealing with the spread of the Delta variant of the novel coronavirus SARS-CoV-2. More than half the Australian population living in the states of New South Wales and Victoria, as well as the Australian Capital Territory (ACT), had endured prolonged severe lockdowns since mid-2021. During this period, travel between states was strictly limited, with firm internal border controls imposed by state governments. The Australian federal and state governments were struggling with the delivery and administration of a mass COVID vaccination program. There were access and supply problems, complicated by highly publicised controversies about the safety of the AstraZeneca vaccine due to a rare side effect involving blood clots [5], together with complacency about COVID risk in parts of Australia where there had been few COVID cases [25–27]. In the interviews conducted at this time, participants were asked new questions about how much at risk of COVID they currently felt, whether they had received any COVID vaccines, what type of vaccine, how they felt about the vaccine and how they felt they could best protect them-

selves against COVID. This article focuses on analysing the responses to these questions. An overview of sociocultural perspectives on lay understandings of health risk, protection from pathogens and immunity is provided as a background. Details of the project are then outlined, followed by a thematic analysis of the interviews and discussion and conclusion sections exploring the implications of the findings.

## Background

Research seeking to identify the relationships between concepts of health and risk has demonstrated that there is a strong connection between people's understandings and practices related to the risks of viral infection and vaccination with those concerned with promoting general good health and a strong immune system. Social researchers and medical historians have further shown that concepts of human immunity and immune systems are framed through social, cultural and political perspectives which have changed over time in response to scientific discoveries concerning pathogens and human immune systems as well as outbreaks of novel infections. Well before pathogens were identified, common ideas about protection against infectious disease emphasised improving and maintaining general good health together with obtaining 'natural immunity' through exposure to disease [28,29]. This scholarship has shown that understandings of human immunity have evolved from the 'attack' and 'defence' model of the early twentieth century [30] towards the concept of the porous, precarious and dynamic immune system [31]. People now often think of immune systems as being unique to the individual, based on their health history and lifestyle [6,32].

Since the introduction of mass vaccination campaigns, the concept of improving immune responses to infection through vaccination has become widely accepted: both as a form of personal protection from disease and as a way to protect the rest of the community by establishing herd immunity via mass vaccination initiatives [31]. However, pre-Pasteurian understandings of immunity can still be traced in contemporary discussions of 'natural' or 'wholistic' health. Sociologist Mark Davis' recent book *Selling Immunity: Self, Culture and Economy in Healthcare and Medicine* [6], identifies a series of contemporary dominant discourses on immunity in popular culture, scientific practice and knowledge and lay people's accounts. These include the discourses of immunity as a personal resource, providing self-defence against infection; the notion that one can improve one's immunity through hygiene practices such as hand washing; and the idea that the immune system can be strengthened through self-care, with practices such as taking vitamins, getting enough sleep and avoiding stress. These approaches emphasise what Davis characterises as 'the personalized crafting of immunity' [6].

'Natural' approaches to improving immunity against pathogens are particularly evident in anti-vaccination discourses [33–36] and among parents who are vaccine hesitant and refuse vaccination for their children [37,38]. However, these perspectives are also commonly found among people who support vaccination. Several studies involving mothers of young children in the Global North have found that while these women consider vaccination to be an important way of boosting their children's undeveloped immune systems, they also value what they consider to be more natural forms of improving immunity, such as breastfeeding and providing a healthy diet and fresh air [39–41]. The 'hygiene hypothesis', or the idea that exposure to pathogens is important to boost immune systems, is also often articulated in lay accounts [6,31].

The concept of 'immunitary moralism' has been used to describe lay understandings of personal responsibility for bolstering one's immune system through such practices as vaccination

and general health promotion, as well as avoiding over-use of antibiotics [31]. Such discourses, rationales and practices are strongly related to broader concepts of personal responsibility and self-management in relation to health risks that have been central in health policy and health promotion across the globe in recent decades [31,42–44]. Throughout the COVID pandemic, the emphasis on personal responsibility has been prominent: often accompanied by discourses of blaming and shaming of people who have been deemed to have breached norms of behaviour in relation to COVID control. Similar to public communication related to previous outbreaks of infectious diseases [6] or to the problem of antimicrobial resistance [31,45], messages about the importance of protecting others by engaging in hygienic practices or accepting recommended vaccination doses have also dominated news reports, government authorities’ announcements and public health campaigns [1,6,46]. People with COVID have been instructed to stay at home or in quarantine facilities, while others have been encouraged to physically distance from each other, wash their hands regularly, wear masks, accept vaccinations, seek testing if exposed or experiencing symptoms, and care for themselves at home if they do become ill with COVID [1,47]. People who have disobeyed such instructions have often been depicted in strongly moralistic terms as lacking good sense, being ignorant or even flagrantly placing others at risk (as the term ‘Covidiot’ encapsulates) [48,49]. Some people diagnosed with COVID have also experienced public shaming as well as stigma, feelings of guilt and ostracism for placing themselves and others at risk by becoming infected [1,50,51].

Unlike countries such as Sweden and the UK [10,11], in Australia there had not been any serious focus on attempting to generate herd immunity by exposing people to infection. Once the disastrous effects (escalating case numbers and deaths) became evident in other countries, it quickly became clear that such a goal was not achievable through natural exposure to the virus. Instead, in the first year of the pandemic, Australian government messaging and planning focused on an ‘assertive suppression’ strategy while awaiting an effective vaccine, involving continued closure of international borders and regular closing of state/territory borders as well as lockdowns [52]. The government continually advocated for the original hygiene practices to prevent against infection by the COVID virus, mask wearing, and in some places, mask mandates, had been introduced. In early 2021, with the release and approval of COVID vaccines, COVID control efforts in Australia were specifically directed towards mass vaccination programs. By mid-2021, the government had managed to secure an adequate supply of COVID vaccines after months of delay and major mass vaccination efforts were underway. Australians were promised that receiving a double dose of the recommended COVID vaccines would offer ‘the way out of lockdown’ and lead to a more ‘normal’ life with far greater control of the pandemic [25–27,53]. The context in Australia concerning risk, protection and immunity at this stage, therefore, was very different compared with the early months of the pandemic.

**Methods**

The ‘Australians’ Experiences of COVID-19’ project began in May 2020. The author is the leader of the project, with sole responsibility for designing the project, planning the methods, supervising data collection and leading analysis. This is not a longitudinal study: the participant groups were different for each of Stage 1 and Stage 2. Both stages involved 40 adult Australians (resulting in a total of 80 participants across the two stages) and recruitment was structured for each stage by the same sub-quotas to ensure a diversity of sociodemographic attributes and geographical loca-

tions. Semi-structured interviews were conducted for both stages by telephone, which allowed for ready inclusion of participants from all over Australia as well as allowing for COVID-safe remote participation. Participants were provided with an AUD\$50 gift card as compensation for their time.

*Ethics*

The study was conducted according to the guidelines of UNSW Sydney and received approval from the UNSW Human Research Ethics Committee (Protocol code HC200292). All participants received project information sheets and signed participant consent forms allowing anonymous excerpts from their interviews to be published. All participants were given pseudonyms to protect their anonymity when reporting findings.

*Participants*

A research company was engaged to recruit and interview volunteers from their research panel members to participate in the Stage 2 round of interviews. Potential participants were told that the interviews would be about their experiences of the COVID pandemic. For both the Stage 1 and 2 interview sets, the participants included resided in every state and territory of Australia and a mix of rural and metropolitan areas were recruited. Sub-quotas were also set for gender to ensure equal participation of women and men and for a good spread of age groups. Table 1 shows the sociodemographic characteristics of the participants in the Stage 2 set of interviews.

*Interviews*

The Stage 1 interviews were conducted between late May and late July 2020. People across Australia were emerging from the strict national lockdown that began in late March 2020, with restrictions beginning to be lifted from mid-May as numbers of COVID cases plummeted. Findings from Stage 1 of the project are published elsewhere [71–74]. In Stage 2 of the project, the interviews were conducted in a two-week period between late September and early October 2021. This was a time when it appeared that the effects of the Delta variant were receding due to the rapid uptake of COVID vaccination in regions that had been affected by lockdowns [25,27]. The Omicron variant was on the horizon but had not yet had an impact (it was detected in South Africa in late November and began to spread quickly in Australia in early December). All interviews in Stage 2 were conducted by a social researcher from the contracted research company, under the guidance of the author and using the interview schedule designed by

**Table 1**  
Stage 2 participant characteristics (n = 40).

<b>Gender</b>	
Female	20
Male	20
<b>Age group</b>	
18–29	10
30–49	10
50–69	10
70+	10
<b>Location</b>	
Metropolitan	26
Rural	14
<b>Education</b>	
University	21
No university	19

the author. The interviews were audio-recorded and fully transcribed by a transcription service for analysis.

### Analysis

The interview transcripts were analysed using an iterative inductive thematic approach conducted by the author [22,54]. This approach to analysis is well-established and common in sociological and applied health qualitative research, where research projects are often conducted by a sole researcher rather than a team of researchers. This analytical approach does not attempt to mimic the scientific approach of quantitative research, but rather relies on the skill of the analyst in interpretation [55]. Themes are viewed as patterns of shared meaning that are identified via careful reading across the research texts (in this case, interview transcripts). This analytical approach recognises that all research design and analysis approaches (qualitative or quantitative) are undertaken from the situated perspective of the researcher. It sees the in-depth interview as a form of shared storytelling [56].

Themes were identified by the author repeatedly reading through the transcripts and looking for overarching concepts and rationales under which the interviewees' accounts of their experiences, knowledges, practices and beliefs could be organised in relation to the main topics on which this article focuses: COVID-related risk, protection and immunity. During the analysis, these ideas were organised around the following themes: general promotion of good health and bolstering immunity; the importance of vaccination for personal protection; vaccine side effects and weighing up the risks; COVID case numbers and vaccination levels in the community; and combining protective strategies to reduce risk. Each of these themes is discussed in further detail below, with examples drawn from participants' accounts to illustrate how they expressed their experiences and ideas.

## Results

### *General promotion of good health and bolstering immunity*

In response to the question about how they thought they could best protect themselves against COVID, participants frequently referred to practices for the general promotion of good health. These included ensuring a healthy diet, keeping physically fit through regular exercise and getting enough sleep. Taking vitamins was also frequently suggested as a way of strengthening resistance against becoming infected or ill with COVID. The phrases 'doing the right things' or 'doing the basics' were employed across regions and age groups, suggesting that most people shared these understandings of promoting health and improving resistance to infectious disease.

I'm in my early 50 s now, so it's really important, I want my health and my physical ability to stay good ... So, yeah, just the basics, just diet, sleep, exercise and self-care as much as you can fit it in. (Joanna, aged 53, regional city, Victoria)

Just doing the right things – exercising, eating right. I believe in vitamins, taking extra vitamins and stuff like that to maintain the balance between everything that you don't get in your diet and whatnot. (Josh, aged 26, Sydney, New South Wales)

There were no questions in the interview schedule that specifically made reference to 'immunity' or 'immune systems'. However, many participants spontaneously used these terms when responding to the question about how they could best avoid infection risk and protect themselves from COVID. For example, Lisa

(aged 32, regional town, Northern Territory) discussed how taking certain vitamins would help strengthen the immune response to the COVID virus:

I've been taking vitamin and multivitamin, and zinc, and vitamin D. I read somewhere it can help [against COVID]. Even if it doesn't help, I guess, it's good for you ... When we didn't have the vaccine, I got [the family] onto some supplements. And if nothing else, it was just designed to maybe increase our immune system by that one or two percent that we might need – that if we needed it, if the virus struck us, we could fight it.

Older people, as well as those who were living with chronic conditions such as diabetes, heart disease or asthma or who were receiving treatment for cancer, were highly aware that they were at increased risk from severe COVID because their immune systems were not as strong as young people or those in better health. Keith, aged 71 (regional Victoria), is one such example. He commented that he felt very much at risk from COVID, because: 'My immune system is very, very iffy because I'm a recovering cancer patient twice and my immune system is really down very, very low'. Other participants expressed concern about their partners, children or friends who were more at risk from severe COVID. Joanna made reference to her husband, noting that she did not want to become infected and pass the virus onto him:

he's a bit asthmatic and his immune system is not great. And I think he'd get hit probably more than me. I'm just really conscious of [the risk of infection]. And it's out there and you hear people sneezing and you go, "Oh, God". And I just still feel anxious.

Jennifer, aged 56 (regional New South Wales), discussed the precautions she was taking when inviting a friend and her husband to her house for dinner. The friend's husband was very ill, so Jennifer was highly aware that she needed to do her best to ensure that he was not exposed to COVID:

So we had them around for dinner on Saturday night. But we make sure we haven't got more than five people we're inviting to the house. Is it all good? Are we all double vaxxed? Because we're inviting someone who's very vulnerable and we've got to be one hundred per cent sure that he's going to be safe.

As Jennifer's comments suggest, such arrangements take into account factors such as the health status of guests to the home, the number of people invited and the vaccination status of guests when assessing how best to make a guest 'safe' from COVID.

## Results

### *The importance of vaccination for personal protection*

All 40 participants said that they had had at least one vaccine dose. While some people expressed reservations about the possible side effects of vaccines (and particularly the AstraZeneca vaccine that had received so much negative publicity), nearly all participants expressed strong support for vaccination and the protective benefits it offered. As Kim (aged 54, regional New South Wales) observed,

you've got to have a decent chance of fighting it off so I'm all for vaccination – get your vaccination! I'm due for my second one soon, so I'm really pushing, I'm really happy to get that double dose thing happening.

The terms 'immunity' or 'immune system' were most frequently used in participants' accounts when they were describing the protection offered by COVID vaccines. Some people, such as Andy

(aged 37, Adelaide, South Australia), considered it important to strengthen their immune systems through vaccines rather than through the 'natural immunity' bestowed by infection. Andy said that he has had his first dose of Pfizer and is waiting for his second dose. He believed that receiving double doses of a COVID vaccine was important to 'build up the immunity' and 'speeds up the process' of fighting COVID. Even if he were infected, COVID would become much less severe, or 'like the everyday cold'.

By contrast, one participant described the importance of exposing oneself to the novel coronavirus to educate the immune system. Montanna, aged 28 (Melbourne, Victoria), had sought out vaccination because she wanted to be free to socialise and travel again and felt 'forced' to conform to the government's rules about vaccination. She said that while 'taking care of your bodies' and 'looking after your health' are important, people need to be exposed to pathogens like the coronavirus to 'build' immunity: 'we probably have to be, you know, exposed to COVID and our body needs to learn to fight it'.

Montanna's perspective was very much a minority view, however. Most of the other participants were highly aware of the risks of becoming infected from COVID and wanted to avoid exposure to the virus as well as they could. They understood that even double vaccination status did not fully prevent infection but knew it would protect them against severe disease. Joanna commented that she was looking forward to the time at which her adolescent children would be fully vaccinated, so that she could feel less anxious about them contracting COVID. She saw full vaccination as offering far greater protection.

The kids are all partly immunised so we're relaxing more. And within a couple of weeks the kids will both be fully immunised so the pressure's, sort of, off there.

Older people (those aged 70 and over) were very supportive of vaccines. They frequently noted that due to their age, they were more at risk of severe COVID and therefore highly appreciative of the fast development of the COVID vaccines. For example, Mary (aged 70, Brisbane, Queensland) said:

I just think the vaccine is such a great thing. And you know, people have worked so hard to get us to where we are and without that, we wouldn't be in any position to be able to do anything, really. I just look at it as if it's like any vaccine that you have for the flu or for the whatever.

People in this generation often made reference to their experience of disease and vaccination over their lifetimes when expressing their appreciation that COVID vaccines existed. As Keith observed,

Look, it's important, having been born in the 1950 s, post war, vaccines were imperative for a lot of things like diphtheria and a lot of common illnesses, and we were basically brought up with vaccines. So the oldies are probably more used to it than what the youngsters are. And it's essential.

People living with chronic disease or who were immunocompromised were also among the most fervent supporters of COVID vaccination, as they saw it as the main way to reduce their vulnerability to COVID. For example, Susan, aged 66 (regional South Australia) has diabetes, and noted that: 'It's said that the pandemic is a disease of the unvaccinated, and that resonated with me. You do feel stronger or safer being vaccinated'.

#### *Vaccine side effects and weighing up the risks*

People weighed up the relative risks of the vaccines and that of becoming infected with the novel coronavirus and potentially falling ill or dying. Here again, perception of personal vulnerability to

severe COVID was an important factor in risk assessments. For participants who were in higher risk groups, it was obvious to them that accepting as many vaccine doses as were available to them as soon as possible was important to protect themselves. This was even the case for the controversial AstraZeneca vaccine. As Susan recounted:

Well, I wasn't very happy at having the AstraZeneca because I'd heard about blood clots. And I rang around to try to find Pfizer, but there was no Pfizer at the time in my area. So I decided I'd rather take the AZ than not have it, and I was lucky I didn't have any reaction whatsoever. At the time, I would have preferred to wait a bit longer and have it, but because I was vaccinated and I travelled, I felt better about that. Secondly, it's so long ago now that obviously, I didn't have any side effects; I would have known by now. So in hindsight, now, I'm happy that I had it and I'm relieved that I'm double vaccinated.

Other people, including those in younger age groups, had experienced some side effects from the vaccines but considered these short-term symptoms to be worth it to be protected against severe COVID. As Jessica, aged 25 (Melbourne, Victoria), said: 'I did have some side-effects after the second dose but I think in the current scheme it's a very small price to pay for increased immunity against COVID'. Similarly, Sophia, aged 30 (Canberra, ACT) noted that:

I didn't react very well to the first [vaccine dose], and I've never really had that sort of reaction from a vaccine before. So that got me a little bit concerned maybe. But other than that, I think it's probably fine.

Georgia, aged 26 (Canberra, ACT), said that she and her partner had experienced quite significant side effects from the second dose of the COVID vaccine they had received.

The experience of the after-effects of the second dose of Pfizer was pretty rough on both of us. You sort of just feel like death warmed up for a little bit. And that was sort of like well, if this is like, a taster of what COVID feels like, then COVID's going to feel really awful.

Rather than make her feel negative about the vaccine, this experience had demonstrated to Georgia just how severe COVID could be for those who were unvaccinated, impelling her to become even more careful about avoiding exposure.

#### *COVID case numbers and vaccination levels in the community*

Awareness of how many COVID cases had been identified in their community or state/territory in recent times was a central theme in participants' discussions of COVID risk. People who resided in areas where at the time of interview there had been comparatively few cases of COVID often expressed the idea of 'luck' or 'good fortune' that their states had not experienced many COVID cases. Jim, aged 75, lives in the city of Adelaide in South Australia, where at the time of interview there were few COVID cases and residents had experienced only one prolonged lockdown – the first national one in early 2020. Jim commented that:

We've been pretty lucky here in South Australia, probably luckier than most. So we haven't had a lot of restrictions apart from the very first time that lockdown has come in.

Zara, aged 24, lives in Perth, Western Australia. Due to hard and prolonged border closures imposed by that state's government, at the time of interview residents of Western Australia had experi-

enced the COVID crisis very differently from the rest of Australia. For Zara, this meant that she felt at very low risk of contracting the COVID virus:

even if there was COVID in WA, when we've had one or two cases, it just stops right away ... it's just much more likely to get a lot of other things well and truly that will kill me before I get COVID ... You don't see it here, so you don't have to think about it. You don't have to wear a face mask; you don't have to social distance. We're 100% capacity for everything. So it makes it seem as if what's happening everywhere else is like a dream, like it's not our reality here.

In other locations, where COVID cases were higher and people had been living in extended lockdowns during the Delta variant period, concepts of risk were closely tied to both case numbers and vaccination rates in the community. Keely, aged 27, lives in Canberra, where residents had been going through a prolonged lockdown to contain the Delta variant outbreak. She noted that she felt concerned about rising case numbers in her city at the time of interview. However she went on to say that she felt largely protected because of her state of general good health and her vaccination status.

I think there's a baseline level of risk that you'd think exists because you see case numbers jumping up every day. But generally speaking I think I'm pretty healthy and double vaxxed and look after myself pretty well, so I think I'm all right, even if I do get it.

Another example was Georgia, also a resident of Canberra. Georgia said that she still feels 'moderately' at risk from COVID. Georgia sought to achieve a greater feeling of security by regularly checking government notification of exposure locations (public places visited by people who had subsequently tested positive for COVID). While this continual checking helped Georgia in feeling that she was protecting herself from infection, it had also had the effect of making her highly aware of the prevalence of COVID in her locale and how often she had nearly come into contact with a positive case.

I check exposure locations – the exposure locations listed every day and I see ones pop up near me. I've narrowly avoided a few by you know, half an hour or so or by a day or so. Like, my local supermarket – I went there on Saturday and Monday, recently and there have been cases there around the same time on Friday and Sunday. I was like "Oh, like I'm going to come into contact with it and there is a risk of getting it". So I'm still moderately worried.

Georgia's comments highlight the multitude of dimensions of risk assessment. She checks locations where COVID cases have been reported in her area, considers whether she has visited them and becomes acutely aware that the virus is circulating very close to where she lives and shops in her local community.

Awareness of how high rates of vaccination were in their locality was expressed by several people. For example, Georgia went on to comment that she paid close attention to the level of vaccination in her city as well.

I still worry that with the amount of COVID bouncing around in the community and vaccination rates only sort of halfway towards where they really need to be to have full immunity, yeah, it still exists. And there's still a level of risk to the community while we're opening up and there are people who haven't been vaccinated who want to be vaccinated.

It was not only personal vaccination practices that contributed to people's feelings of risk or protection, therefore. No-one used the term 'herd immunity' (as this has not been a strategy that has been promoted in Australia), but they pointed out that 'full immunity' of the community would only be achieved if everyone was vaccinated.

#### *Combining protective strategies to reduce risk*

Many people described a cautious approach to reducing their exposure to COVID that involved a combination of protective strategies. John (aged 70, Melbourne, Victoria) said that he feels that his risk is low because of a combination of 'keeping fit', receiving the appropriate numbers of COVID vaccines and living in a place where others were getting vaccinated.

I try to keep fit, so I might build up a little bit of an immune response, maybe. Mainly because I've had the vaccine and I think the majority of people are on the way to having the vaccine as well.

We can see in John's statements the ways that beliefs about building immunity through promoting one's health combine with ideas about the importance of vaccination – both for the individual and for the population, so that communal immunity is developed. Additionally, John emphasised the importance of mask wearing and other precautions to protect against the spread of COVID, including avoiding people who did not take appropriate precautions:

Yes, if that continues, I think for me now, that's maybe a part of life for the foreseeable future. Good hygiene, good hygiene, yeah, good hygiene, maybe, good hygiene and just good practice. Yes, follow what the health experts advise to do and go with that. And then if you see yourself in, maybe in a situation where people should be wearing masks and they're not, then avoid them.

Several others noted that while receiving vaccination was part of a community approach to protecting everyone from the disease, other preventive measures such as mask wearing, physical distancing and checking in to public locations using a QR code app should also be continued by every member of the community. As Dave (aged 75, regional New South Wales) recounted:

We are wearing our masks wherever we go. If we went to a coffee shop or anything or went into a shop, it's mandatory that we got all these things on and with us. We're logging in with QR codes, we're abiding by all the rules that's been asked of us. And, to me, in society, that's not a not a lot to ask for the protection of yourself and others.

Engaging in a panoply of preventive practices helped people feel that they had more control over exposure to COVID viral infection and that at the very least they were doing their best to contain risk. As Mary pointed out, however, there were many risk factors that were beyond people's control, including the timely and accessible provision of mass vaccination as well as continued messaging and restrictions imposed by the government to encourage people to engage in protective behaviours.

I feel like the best way to do it is not something that you can personally control. It's safety measures for the community, which includes mass vaccination for the whole community and restrictions for the whole community, until there's minimal COVID around.

## Discussion

This study surfaced multiple dimensions of the highly contextual aspects of COVID risk in Australia as well as Australians' practices, experiences and attitudes related to immunity, vaccination and protecting their health. The findings show that the extent to which people feel personally at risk from contracting COVID infection, their judgements of the relative risks associated with vaccination against that infection, their other preventive practices (such as wearing face masks, physical isolation, checking into locations or hand hygiene) and their ideas about the most effective ways to maintain a robust immune response to infection all contribute to and intertwine with each other. These concepts and practices are also highly contextual and situated, related to personal biographical and embodied experiences, life stage, and time, place and space.

The temporal dimensions of COVID vaccination acceptance emerged as important in this study. The participants espoused largely unequivocal willingness to accept vaccination, even in the face of potential side effects, as a personal protective measure. Strong support of vaccination was identified in other Australian studies conducted in earlier periods of the COVID pandemic. Nonetheless, this support has vacillated somewhat over time. Australians' willingness to accept a potential COVID vaccine during the early months of the pandemic, when no vaccines had yet been developed, was high [57–63]. Yet in early 2021, when Australia seemed to have largely controlled the spread of the virus, a combination of complacency, concern about side effects and problems with supply resulted in a diminishing of interest in accepting vaccines [64–66]. By mid-2021, there was evidence of increased confusion, hesitation and uncertainty among some social groups in Australia [67,68]. This study's findings suggest that the Delta outbreak and related severe restrictions, lockdowns, limitations on travel and border closures experienced across Australia, together with improved vaccine supplies and major government efforts to encourage all eligible Australians to receive the two vaccine doses recommended at the time, provided strong incentives for Australians to accept vaccination. (Indeed, vaccine rates rose extremely quickly during this period: from 2% of the entire population double vaccinated on 1 June to 65% by 1 November 2021 [69].)

In immunological research, the notion of 'immunological biography' is beginning to incorporate the understanding that an individual's immune system involves biological changes over temporal, spatial, geographical, evolutionary and environmental dimensions. There is a social dimension to this concept of immunological biography: indeed, Grignolio and colleagues [70] have drawn on sociologist Zygmunt Bauman's scholarship on the liquid self to argue that such dimensions operate together to continually change the nature of a person's immune system and response to viruses, bacteria and other immunological stimuli to which they are exposed during their lifetime. While the concept of immune response has always incorporated the idea that it is a continually changing process as new pathogens come into contact with human bodies, this idea of immunological biography brings in factors that have not always been acknowledged. In this understanding, each person's immune system and immune response are dynamic, situated and unique.

This study's findings approach these immunological ideas from a social perspective, identifying the complexities of people's understandings and practices related to COVID risk, protection and immunity. As noted in the Introduction, throughout the COVID pandemic, the emphasis on personal responsibility has dominated in public discussions and health promotion messages issued by governments in countries such as Australia concerning exposure to COVID infection, risk and protective strategies such as vaccination. Not surprisingly, therefore, these ideas also resonated

strongly across the interviews in people's understandings and practices related to risk and COVID. They expressed keen awareness of how the COVID virus is transmitted, what needs to be done to prevent exposure and viral spread, and who has been positioned as particularly vulnerable to the risk of severe COVID (older people, those with chronic health conditions, people who are immunocompromised, and those who are unvaccinated). Evident in the participants' discussions of risk and preventive actions against COVID were discourses that resonate with some of those more generally on immunity identified by Davis [6]. Across the interviews, the notions of immunity as a personal resource providing self-defence against infection and that an individual's immune system can be strengthened through both vaccination and self-care were articulated in people's explanations. These discourses and concepts all relate to how each individual's lifestyle and health history affect their immune response to COVID. They position people's immune systems as being malleable and subject to improvement.

Broader concepts of risk, protection and immunity, however, also appeared in participants' accounts. A notion of 'communal risk' was expressed together with 'individual risk', with acknowledgement that these concepts were interrelated. The discourse of 'immunitary moralism' [31] also appeared in participants' explanations of how they understood and responded to COVID risk. They were adamant that it was up to every person to engage in preventive behaviour and to seek vaccination to avoid infection. The socio-spatial specificity of contexts was evident in the participants' responses. A common suggestion put forward by participants was that while people could boost their own immune system by taking preventive actions such as receiving the recommended number of COVID vaccine doses, avoiding exposure to the COVID virus and keeping fit and healthy, community members also had to play their part by conforming to vaccination protocols, engaging in recommended preventive practices and reducing their exposure to the virus. As one participant noted, these are aspects of COVID risk over which individuals have no personal control. They must rely on other people in their community or region to take responsibility so that risk is reduced for all, with everyone working together to protect each other as well as themselves. Relatedly, people's understandings of what might be characterised as 'communal immunity' – or the collective immune response at a social group level – also dominated in their accounts.

Research conducted in other countries has emphasised the importance of trust in experts or institutions when people are making decisions about COVID vaccination [16–18,22]. It is notable that nearly all the study participants recounted similar understandings and beliefs about COVID risk, immunity and the protection that could be offered by vaccines. These narratives suggest that people have listened closely to and have trusted expert advice about who is most at risk from COVID and how they should be protected and have taken appropriate precautions. However, the findings also underline the value that people may place on protecting communal immunity and acting as part of communities of care: wanting to see others engaging in risk-containing practices as well as taking their own precautions. People want and need to invest trust not only in experts but also in others in their communities. Both communal risk and communal immunity are influenced by a range of constantly changing and interrelated factors. The participants referred to elements such as their community's geographical location; the number of COVID cases and the level of COVID vaccination uptake by others living in their state or territory; social measures such as face mask wearing, isolation and physical distancing; vaccine availability, scheduling and take-up; viral testing and tracing reporting; and the extent and timing of viral spread in the population. These factors were continually related back to highly specific conditions and practices in their locales: even to the point of noting where exposure sites were in their city, town

or suburb (which were particularly important in the states/territory that were experiencing high COVID case numbers and undergoing extended lockdowns during the time of the interviews).

## Conclusions

The study showed that understandings and practices related to COVID risk, protection and vaccination were based both on individual experiences and broader ideas about the role of community. Lay understandings were simultaneously individual and collective. The participants' accounts involved a combination of arguing for the importance of personal responsibility for building immunity and reducing risk together with a notion of shared responsibility for reducing risk. Understandings and practices related to individual risk and protection from COVID were intertwined with those relating to communal risk and immunity. Spatial contexts are influential but there is also a strong temporality to these understandings and practices.

As these participants' accounts suggest, there is a fine balance to be maintained between individual-level protection from COVID risk and community-level actions. These insights, which highlight the intersections of trust and risk with notions of community and shared responsibility, can contribute to further efforts by vaccination and public health communication experts to promote COVID community vaccination programs. The findings also point to the importance both of public health communication and mainstream news coverage in shaping people's understandings of health risk, immunity and vaccination. While the participants had accepted and acted on these messages, they did so not just to protect themselves but to protect their community. Future public health messaging about COVID vaccination should take account of the intersections between concepts and practices of individual and communal risk, immunity and protection, acknowledging people's willingness and desire to trust in and support other members of their communities.

This project has captured a small group of Australians' experiences and concepts in relation to the COVID crisis at a specific period in the pandemic. As shown in this study, people's COVID-related understandings and practices are constantly shifting as they respond to personal experiences, changes in the pandemic (including the emergence of new viral variants) and the introduction of new preventive or mitigation measures. These findings are highly contextual, therefore. Further research across multiple geographical sites that can identify shifts in lay perceptions and experiences of the continuing COVID crisis as it unfolds into the future is recommended.

## Data availability

Data will be made available on request.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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